

IN THE CLAIMS:

Please amend the claims as shown below.

1. (Currently Amended) A method of presenting data from at least one a hierarchical data source, said method comprising the steps of:

- (i) constructing a first view representation of the hierarchical said at least one data source;
- (ii) obtaining an at least one occurrence probability frequency of at least one context data data element from at least the first view of the hierarchical data source previous views of said at least one data source;
- (iii) identifying a at least one compulsory entity in the first view said representation;
- (iv) selecting a determining at least one context entity from the first view in said representation and the [[in]] context data based on the; wherein the determination is based on said at least one occurrence probability frequency; and
- (v) presenting a hierarchical data structure, wherein the hierarchical data structure is a subset of the hierarchical data from the data source, comprising a plurality of context data data elements, wherein each of the plurality of context data said data element corresponds to the identified at least one of said at least one compulsory entity and the selected said at least one context entity,

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence

probability of the context data associated with the compulsory entity, and the context entity is selected from the group consisting of:

(a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

2. to 3. (Cancelled)

4. (Currently Amended) A method according to claim 1 wherein the hierarchical data source ~~said representation~~ comprises a schema representation of said at least one data source and at least one ~~[[said]]~~ previous view of the hierarchical data source.

5. (Previously Presented) A method according to claim 1 wherein said context data comprises data ranked according to relevance of said context entities to said compulsory entity.

6. (Previously Presented) A method according to claim 5 wherein said context data comprises at least one associated data.

7. (Currently Amended) A method according to claim 6 wherein said ~~at least one~~ associated data comprises occurrence probability and a plurality of joint-occurrence frequencies of entities in said hierarchical data source representation observed in ~~at least one said~~ a previous view of the hierarchical data source.

8. to 10. (Cancelled)

11. (Currently Amended) A method according to claim 1 ~~[[10]]~~ wherein said second set of nodes comprises one or more child nodes of at least one parent node in said first view of the hierarchical data source representation lying along said directed path from said ancestor ~~[[root]]~~ node to said ~~at least one~~ compulsory entity.

12. (Currently Amended) A method according to claim 1 ~~[[10]]~~ wherein said corresponding ~~distances comprise~~ distance comprises a number of links separating the nodes in said first view of the hierarchical data source representation.

13. (Currently Amended) A method according to claim 11 wherein, step (iv) comprises selecting said ~~one or more~~ child nodes as context entities [[nodes]] from all child nodes of said ~~at least one~~ parent node, said selecting comprising the steps of:

(iv-a) computing a first occurrence probability of said parent node appearing with none of its child nodes other than a fifth set of nodes, given an [[the]] occurrence probability of said parent node, ~~the ancestor~~ ancestors of said parent node up to and including said root node and said ~~at least one~~ compulsory entity, said fifth set comprising at least one child node [[nodes]] of said parent node lying along a directed path from said parent node to said ~~at least one~~ compulsory entity;

(iv-b) computing a second occurrence probability of each of said child nodes [[node]] in a sixth set of nodes, given the occurrence probability of said parent node, ~~the ancestor~~ ancestors of said parent node up to and including said root node and said ~~at least one~~ compulsory entity, said sixth set comprising at least one child node [[nodes]] of said parent node that do not lie along a directed path from said parent node to said ~~at least one~~ compulsory entity;

(iv-c) computing a total sum of said first occurrence probability and said second occurrence probability probabilities;

(iv-d) creating a fictitious node and assigning said fictitious node said first occurrence probability;

(iv-e) ~~selecting said fifth set of child nodes as context nodes;~~

(iv-e) (iv-f) selecting the fifth set of nodes or a seventh set of nodes as a set of context entities, ~~nodes a~~ wherein the seventh set of child nodes is formed from said sixth set of child nodes and said fictitious node arranged in an order of descending values

of said first occurrence probability or said second occurrence probability, and wherein
a ~~and for which the~~ sum of said first occurrence probability or said second occurrence
probabilities of said seventh set of [[child]] nodes equals or exceeds half of said total sum;
and

(iv0f) ~~(iv-g)~~ deselecting as a context entity [[node]] said fictitious node if
said fictitious node is selected in said seventh set of child nodes,

wherein said first occurrence probability and said second occurrence
probability are approximated using an at least one occurrence probability frequency of a
node in said hierarchical data source representation, a co-occurrence probability frequency
between a pair of nodes in said hierarchical data source representation, and
joint-occurrence probability frequency between an n-tuple of nodes in said hierarchical data
source representation observed in at least one said previous view.

14. (Currently Amended) A method according to claim 13 wherein
said fictitious node prevents other nodes, whose associated probabilities are less than the
probability associated with the fictitious node, from being selected, since a set of nodes are
selected as a set of context entities when the total nodes until their sum exceeds half of the
total sum.

15. (Currently Amended) A method according to claim 11 wherein,
step (iv) comprises selecting said ~~one or more~~ child nodes as context entities [[nodes]]
from all child nodes of said ~~at least one~~ parent node, said selecting comprising the steps of:
(iv-a) computing a first occurrence probability of said parent node

appearing with none of its child nodes other than a fifth set of nodes, given an [[the]] occurrence probability of said parent node, the ancestor ~~ancestors of said parent node up to and including said root node~~ and said ~~at least one~~ compulsory entity, said fifth set comprising at least one child node [[nodes]] of said parent node lying along a directed path from said parent node to said ~~at least one~~ compulsory entity;

(iv-b) selecting said fifth set of child nodes as a set of context entities [[nodes]]; and

if said first occurrence probability is less than or equal to 0.5:

(iv-c) computing, a second occurrence probability of each of said child nodes [[node]] in a sixth set of nodes, given the occurrence probability of said parent node, the ancestor ~~ancestors of said parent node up to and including said root node~~ and said ~~at least one~~ compulsory entity, said sixth set comprising at least one child node [[nodes]] of said parent node that do not lie along a directed path from said parent node to said ~~at least one~~ compulsory entity;

(iv-d) computing a total sum of said second occurrence probabilities of said second set of child nodes;

(iv-e) selecting as the set of context entities [[nodes]] a seventh set of [[child]] nodes formed from said sixth set of [[child]] nodes in an order of descending values of said second occurrence probability until the sum of said second occurrence probability probabilities of said seventh set of child nodes equals or exceeds half of said total sum,

wherein said first occurrence probability and said second occurrence probability are approximated using an ~~at least one~~ occurrence probability frequency of a

node in said hierarchical data structure representation, co-occurrence probability frequency between a pair of nodes in said hierarchical data structure representation, and joint-occurrence probability frequency between an n-tuple of nodes in said hierarchical data structure representation observed in ~~at least one~~ said previous view.

16. (Currently Amended) A method according to claim 1 ~~[[10]]~~ wherein said second set of nodes comprises one or more child nodes of at least one parent node in said first view of the hierarchical data source representation not lying along said directed path from said ancestor ~~[[root]]~~ node to said ~~at least one~~ compulsory entity.

17. (Currently Amended) A method according to claim 16 wherein, step (iv) comprises selecting said ~~one or more~~ child nodes as a set of context entities from all child nodes of said ~~at least one~~ parent node, said selecting comprising the steps of:

(iv-a) computing a first occurrence probability of said parent node appearing without any of its child nodes given the occurrence probability of said parent node, the ancestor ~~ancestors of said parent node up to and including said root node~~ and said ~~at least one~~ compulsory entity;

(iv-b) computing a second occurrence probability of each of said child nodes ~~[[node]]~~ of said parent node given the occurrence probability of said parent node, the ancestor ~~ancestors of said parent node up to and including said root node~~ and said ~~at least one~~ compulsory entity;

(iv-c) computing a total sum of said first occurrence probability and said second occurrence probability probabilities of all child nodes of said parent node;

(iv-d) creating a fictitious node and assigning said fictitious node said first occurrence probability;

(iv-e) selecting ~~[[as]]~~ the set of context entities nodes ~~those nodes~~ from a set of said fictitious node and all child nodes of said parent node arranged in order of descending values of said first occurrence probability or said second occurrence probabilities until the sum of said first occurrence probability or said second occurrence probability of selected nodes equals or exceeds half of said total sum; and

(iv-f) deselecting said fictitious node as a context entity ~~[[node]]~~ if said fictitious node is among said selected nodes,

wherein said first occurrence probability and said second occurrence probability are approximated using an at least one occurrence probability frequency of a node in said hierarchical data source representation, a co-occurrence probability frequency between a pair of nodes in said hierarchical data source representation, and a joint-occurrence probability frequency between an n-tuple of nodes in said hierarchical data source representation observed in at least one said previous view.

18. (Currently Amended) A method according to claim 16 wherein, step (iv) comprises selecting said ~~one or more~~ child nodes as a set of context entities from all child nodes of said ~~at least one~~ parent node, said selecting comprising the steps of

(iv-a) computing a first occurrence probability of said parent node appearing without any of its child nodes given the occurrence probability of said parent node, the ancestor ~~ancestors of said parent node up to and including said root node~~ and said ~~at least one~~ compulsory entity; and

if said first occurrence probability is less than or equal to 0.5:

(iv-b) computing a second occurrence probability of each of the child nodes [[node]] of said parent node given the occurrence probability of said parent node, the ancestor ancestors of said parent node up to and including said root node and said at least one compulsory entity;

(iv-c) computing a total sum of said second occurrence probabilities of all child nodes of said parent node, and

(iv-d) selecting [[as]] the set of context entities nodes, ~~those nodes~~ from the set of all child nodes of said parent node in order of descending values of said second occurrence probability until the sum of said second occurrence probability of selected nodes equals or exceeds half of said total sum,

wherein said first occurrence probability and said second occurrence probability are approximated using an ~~at least one~~ occurrence probability frequency of a node in said hierarchical data source representation, a co-occurrence probability frequency between a pair of nodes in said hierarchical data source representation, and a joint-occurrence probability frequency between an n-tuple of nodes in said hierarchical data source representation observed in at least one said previous view.

19. (Previously Presented) A method according to claim 1 wherein said compulsory entity represents one of:

- (i) a location of one or more search keywords; and
- (ii) a user-selected entity.

20. (Currently Amended) A method according to claim 1 wherein said first view of the hierarchical data source representation comprises a tree representation and step (i) or (iii) includes detecting a user's selection of a sub-tree of said first view representation, and wherein, step (iv) comprises selecting a one or more child node ~~[[nodes]]~~ of a at least one parent node in said user-selected sub-tree in a set of context nodes, said selecting comprising the steps of:

(iv-a) computing a first occurrence probability of said parent node appearing without any of its child nodes given the occurrence probability of said parent node, and the ancestor ancestors of said parent node up to and including the root node of said user-selected sub-tree;

(iv-b) computing a second occurrence probability of each of said child nodes ~~[[node]]~~ of said parent node given the occurrence probability of said parent node, and the ancestor ancestors of said parent node up to and including the root node of said user-selected sub-tree;

(iv-c) computing a total sum of said first occurrence probability and said second occurrence probability probabilities of all child nodes of said parent node;

(iv-d) creating a fictitious node and assigning said fictitious node said first occurrence probability;

(iv-e) selecting ~~[[as]]~~ the context entity nodes ~~those nodes~~ from the set of said fictitious node and all child nodes of said parent node in order of descending values of said first occurrence probability or said second occurrence probability until the sum of said first occurrence probability or said second occurrence probability of selected nodes equals or exceeds half of said total sum; and

(iv-f) deselecting said fictitious node if said fictitious node is among said selected nodes.

21. (Currently Amended) A method according to claim 1 wherein said first view of the hierarchical data source representation comprises a tree representation and step (i) or (iii) includes detecting a user's selection of a sub-tree of said first view representation, and wherein, (iv) comprises selecting a one or more child node ~~[[nodes]]~~ of a at least one parent node in said user-selected sub-tree ~~in a set of context nodes~~, said selecting comprising the steps of:

(iv-a) computing a first occurrence probability of said parent node appearing without any of its child nodes given the occurrence probability of said parent node, and the ancestor ~~ancestors of said parent node up to and including the root node of~~ said user-selected sub-tree;

if said first occurrence probability is less than or equal to 0.5

(iv-b) computing a second occurrence probability of each of said child node of said parent node given the occurrence probability of said parent node, and the ancestor ~~ancestors of said parent node up to and including the root node of~~ said user-selected sub-tree;

(iv-c) computing a total sum of said second occurrence probability of all child nodes of said parent node; and

(iv-d) selecting the ~~[[as]]~~ context entity nodes ~~those nodes~~ from the set of

all child nodes of said parent node in order of descending values of said second occurrence probability until the sum of said second occurrence probability of selected nodes equals or exceeds half of said total sum.

22. (Currently Amended) A method of construction and presentation of data for a keyword searching operation in a hierarchical ~~at least one~~ data source involving ~~a~~ at least one search keyword, said method comprising the steps of:

(i) constructing a ~~[[non-]]graphical~~ first view representation of ~~the hierarchical~~ said at least one data source ~~and a plurality of previous views of said at least one data source;~~

(ii) identifying ~~a~~ at least one compulsory entity in said ~~[[non-]]graphical first view~~ representation, wherein said compulsory entity is a node in said ~~[[non-]]graphical first view~~ representation representing a location of ~~one or more~~ said at least one search keyword;

(iii) obtaining an occurrence probability of at least one context data from at least the first view of the hierarchical data source;

(iv)~~[[iii]]~~ constructing a hierarchical ~~at least one~~ data structure, wherein the hierarchical data structure is a subset of the hierarchical data source comprising said ~~at least one~~ compulsory entity and one or more context entities corresponding to the ~~at least one~~ search keyword, wherein said context entities are obtained from said ~~[[non-]]graphical first view~~ representation using the context data and the occurrence probability ~~obtained from said plurality of previous views;~~ and

(v) ~~[[iv]]~~ presenting said hierarchical ~~at least one~~ data structure as a result of said keyword searching operation,

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence probability of the context data associated with the compulsory entity; and

the context entity is selected from the group consisting of:

(a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

23. (Cancelled)

24. (Currently Amended) A computer readable storage medium,

having a computer-executable program recorded thereon, wherein the program is configured to make a computer execute a procedure to present data from at least one a hierarchical data source, said program comprising:

- (i) code for constructing a first view representation of the hierarchical said at least one data source;
- (ii) code for obtaining an at least one occurrence probability frequency of at least one context data data element from at least the first view of the hierarchical data source previous views of said at least one data source;
- (iii) code for identifying a at least one compulsory entity in the first view said representation;
- (iv) code for selecting determining at least one context entity [[in]] from the first view said representation and the [[in]] context data based on the, wherein the determination is based on said at least one occurrence probability frequency; and
- (v) code for presenting a hierarchical data structure, wherein the hierarchical data structure is a subset of the data from the hierarchical data source, comprising a plurality of context data elements, wherein each of the plurality of [[said]] context data element corresponds to the identified at least one of said at least one compulsory entity and the selected said at least one context entity,

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence probability of the context data associated with the compulsory entity, and

the context entity is selected from the group consisting of:

- (a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

25. (Cancelled)

26. (Currently Amended) A computer readable storage medium, having a computer-executable program recorded thereon, wherein the program is configured to make a computer execute a procedure to construct and present data for a keyword searching operation in a hierarchical ~~at least one~~ data source involving a ~~at least one~~ search keyword, said program comprising:

(i) code for constructing a first view ~~non-graphical representation of the hierarchical~~ ~~said at least one data source and a plurality of previous views of said at least one data source;~~

(ii) code for identifying a at least one compulsory entity in said first view non-graphical representation, wherein said compulsory entity is a node in said first view non-graphical representation representing a location of one or more said at least one search keyword;

(ii) obtaining an occurrence probability of at least one context data from at least the first view of the hierarchical data source;

(iv) [(iii)] code for constructing a hierarchical at least one data structure, wherein the hierarchical data structure is a subset of the hierarchical data source, comprising said at least one compulsory entity and one or more context entities, wherein said context entities are obtained from said first view non-graphical representation using the context data and the occurrence probability obtained from said plurality of previous views; and

(v) [(iv)] code for presenting said hierarchical at least one data structure as a result of said keyword searching operation,

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence probability of the context data associated with the compulsory entity, and

the context entity is selected from the group consisting of:

(a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a

corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

27. (Cancelled)

28. (Currently Amended) Computer apparatus for constructing at least one data structure from a hierarchical ~~at least one~~ data source, said apparatus comprising
a constructing module configured to construct a first view representation of said hierarchical ~~at least one~~ data source;

an obtaining module configured to obtain an ~~at least one~~ occurrence probability frequency of at least one data element from at least the first view of the hierarchical ~~previous views of said at least one~~ data source;

an identifying module configured to identify a ~~at least one~~ compulsory entity in the first view said representation;

a selecting ~~determining~~ module configured to select a ~~determine at least one~~ context entity from the first view in said representation and the ~~the~~ [[in]] context data based on

the, wherein the determination is based on said at least one occurrence
probability frequency; and

a presenting module configured to ~~presenting~~ present a hierarchical data structure, wherein the hierarchical data structure is a subset of the hierarchical data from the data source, comprising a plurality of context data data elements, wherein each of the plurality of context data said data element corresponds to the identified at least one of said at least one compulsory entity and the selected said at least one context entity;

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence probability of the context data associated with the compulsory entity; and

the context entity is selected from the group consisting of;

(a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

29. (Cancelled)

30. (Currently Amended) Computer apparatus for construction and presentation of data for a keyword searching operation in a hierarchical ~~at least one~~ data source involving ~~a~~ at least one search keyword, said apparatus comprising:

a constructing module configured to construct a first view non-graphical representation of ~~the hierarchical~~ said at least one data source ~~and a plurality of previous views of said at least one data source;~~

an identifying module configured to identify ~~a~~ at least one compulsory entity in said first view non-graphical representation, wherein said compulsory entity is a node in said first view non-graphical representation representing a location of ~~one or more~~ said ~~at least one~~ search keyword;

an obtaining module configured to obtain an occurrence probability of at least one context data from at least the first view of the hierarchical data source;

a determining module configured to select a ~~determine at least one~~ context entity from said first view non-graphical representation and the occurrence probability ~~[[using]]~~ context data obtained ~~from said plurality of previous views;~~

a constructing module configured to construct a hierarchical ~~at least one~~ data structure, wherein the hierarchical data structure is a subset of the hierarchical data

source, comprising said at least one compulsory entity and said one or more context entity entities; and

a presenting module configured to present said hierarchical at least one data structure comprising said at least one compulsory entity and said at least one context entity as a result of said keyword searching operation,

wherein the hierarchical data structure is assigned a score equal to an occurrence probability of an ancestor node of the compulsory entity given the occurrence probability of the context data associated with the compulsory entity, and

the context entity is selected from the group consisting of:

(a) the ancestor node;

(b) a first set of nodes along a directed path in the hierarchical data source from the ancestor node to the compulsory entity;

(c) a second set of nodes selected from a descendent node of the ancestor node in the first view, each of the second set of nodes being selected based on a corresponding occurrence probability, said occurrence probability being derived from the occurrence probability of the ancestor node;

(d) a third set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the third set of nodes to the ancestor node in the first view; and

(e) a fourth set of nodes selected from a descendent node of the ancestor node in the first view based on a corresponding distance from each of the fourth set of nodes to the compulsory entity in the first view.

31. to 34. (Cancelled)

35. (Currently Amended) A method according to claim 4 wherein said schema representation is updated as at least one new query is ~~queries are~~ logged.